USDA United States Department of Agriculture

Trees and Shrubs

ESTABLISHING AND MAINTAINING BARE-ROOT SEEDLINGS

Conservation Fact Sheet ***February 2016***

INTRODUCTION

Trees and shrubs may be planted to reduce soil erosion and sedimentation, improve water quality, produce commercial timber, provide wildlife habitat, beautify an area, and provide shade.

This fact sheet provides instructions for planting and maintaining trees and shrubs so that they can serve their intended purpose. Using proper planting and management techniques, especially during the establishment years, will significantly improve plant health and survival.

SITE PREPARATION

Before planting, it is essential to reduce competition from other vegetation that may be present on the planting site, such as grasses or weeds. The type and density of existing vegetation will determine how much pre-planting control is needed.

It's important to allow adequate time to complete this process. If significant amounts of noxious or aggressive weeds or invasive plants are present, be aware that you may need a year or two to control them before you can plant, especially if you will be planting a large area. Noxious weeds — johnsongrass, shatter-cane, bull thistle, Canada thistle, musk thistle, and plumeless thistle — must be controlled as required by Maryland state law.

For more information about controlling specific weeds in tree and shrub plantings, contact your local Maryland Cooperative Extension office or county weed control specialist.

Sites without Existing Vegetation

If the seedling trees and shrubs will be planted into a clean, relatively weed-free area (such as cropland that was planted during the previous growing season), then competition from existing vegetation should not be a concern. However, a companion planting (see page 2) may be needed or desirable for erosion control and/or to reduce future weed competition.

Take into account any noxious or aggressive weeds on the site that might have been suppressed (but not killed) with previous herbicide applications. If live rootstocks are present, these weeds may be very difficult to kill in a new planting without destroying the desirable plants. If you think you may have a weed problem, or if you don't know the site's weed history, it may be prudent to wait one full growing season to see what comes up. Use an appropriate herbicide to treat weeds if they occur, and plant a full-season cover crop. Then plant the trees and shrubs in the following spring.

Figure 1. A successful tree planting. The tree shelters are no longer needed to protect these trees, and should be removed. *Photo by S. Strano.*

Sites with Existing Vegetation

If trees and shrubs are going to be planted into existing vegetation (e.g., grasses, weeds), you will need to reduce competition before planting. For sites that need extensive preparation, much of the work can be done during the fall prior to spring planting.

Mow or brush hog the field or planting strips. Then either treat the area with an appropriate herbicide or cultivate the planting area to reduce competition.

Using herbicides. Choose a non-selective herbicide such as glyphosate (e.g., Roundup, KleenUp). A selective herbicide such as 2,4-D may be used instead, depending on the species of weeds you are trying to control. Follow all label directions when using herbicides and consider herbicide persistence (carryover) as it may affect new plantings.

Program Participation *– If you are enrolled in a program that provides financial assistance for establishment and/or management of trees and shrubs, specific restrictions and requirements may apply. Refer to the program guidance provided in addition to this fact sheet.*

For extremely vigorous turf or weeds, you should plan to make one application of herbicide in early fall, followed by another the next spring before planting. Or if you make the first herbicide application in the spring, you should plan to make a second application a few weeks before planting, if needed.

Do not plant seedling trees and shrubs until the competing vegetation is sufficiently controlled. It is much easier to control the competition before planting than afterward. Cultivation of the planting area may be needed following herbicide treatment if the dead plant matter is too thick and will be difficult to plant through. You may also need to re-spray after cultivation if weed seeds brought to the surface germinate.

Using cultivation only. If you do not want to use herbicides, then you will need to cultivate the field or planting strips. Cultivation is usually less effective than herbicides for killing heavy sod or persistent weeds. Also, the bare ground produced by cultivation may be subject to erosion and can provide a good seedbed for more weed growth. If necessary, use a companion planting mix (as described below) to control erosion and suppress weeds. For small planting areas, wood mulch or weed mats may also be used for controlling erosion and suppressing weeds.

Companion Planting

A companion planting mix of herbaceous species may be needed or desirable for erosion control and/or to reduce future weed competition, especially on large cultivated areas or where mulching is not feasible. Be aware that if you don't provide ground cover, then nature will. Nature's choice is likely to be weeds that you will need to control. Table 1 provides a recommended mix of three fine fescue grasses, plus annual and biennial wildflowers or clover.

Table 1. Recommended companion seeding mix for tree and shrub plantings.

FINE FESCUE MIX	**Seeding Rate (lbs/ac)**
Red Fescue (*Festuca rubra*) **or** Chewings Fescue (*Festuca rubra* ssp. *commutata*)	3 - 6
Hard Fescue (*Festuca brevipila*)	3 - 6
Sheep Fescue (*Festuca ovina*)	3 - 6
AND ADD WILDFLOWERS:	
Black-eyed Susan (*Rudbeckia hirta*)	0.25
Tickseed (*Coreopsis tinctoria*)	0.25
Partridge Pea (*Chamaecrista fasciculata*)	1 - 2
OR ADD CLOVER MIX:	
White Clover (*Trifolium repens*)	1 - 2
Red Clover (*Trifolium pratense*)	1 - 2

Alternatively, planting only the fine fescues (no clover), or only one fine fescue species plus wildflowers or clover, is also acceptable. Use the higher seeding rates for erosion control, and the lower rate if only weed suppression is needed. The companion mix can be planted in the fall prior to a spring planting of trees and shrubs, or in the spring along with the tree/shrub planting.

Herbicide Carryover

Carryover from herbicide treatments (recently applied or from prior years) can pose a threat to new plantings. Seedlings are particularly sensitive to herbicide carryover. The persistence of herbicides is directly affected by factors such as soil pH and moisture. To assess risks before planting, read the herbicide label or contact the manufacturer for specific information on persistence. Where seedlings will be planted in former agricultural fields, take account of previously used herbicides, to the extent known.

PLANTING TREES AND SHRUBS

Trees and shrubs that are planted correctly will grow faster and will be more likely to survive than ones that are planted incorrectly.

Always check for utility lines (water, gas, electric, cable) before planting. Avoid planting on top of buried utility lines or below overhead lines.

Plant Availability and Planting Dates

Bare-root plants are typically available only during late winter to early spring, and generally must be planted during that time. To obtain recommended planting dates for your area, contact your local NRCS Service Center.

Storing and Planting Techniques

Bare-root seedlings must be properly handled and stored to ensure a successful planting. When the seedlings arrive, open the packages and check the plants for molding or excessive dryness. If they are satisfactory, store them in a cool, shady place with the roots protected, and plant within a few days.

If the seedlings cannot be planted immediately, dig a trench about a foot deep and bury the seedlings' roots in soil. This is called "heeling-in." Pack the soil firmly, water thoroughly, and make certain all roots are covered. The seedlings may also be stored well wrapped in a refrigerator as long as the plants are still dormant.

Evergreens require very careful handling. When heeling-in evergreens, split the small bundles and spread out the seedlings in a trench to make sure the root system of each seedling is protected by soil.

Bare-root seedlings can be machine planted, or hand planted with a planting or dibble bar or a spade. See Figures 2 and 3 for hand planting information.

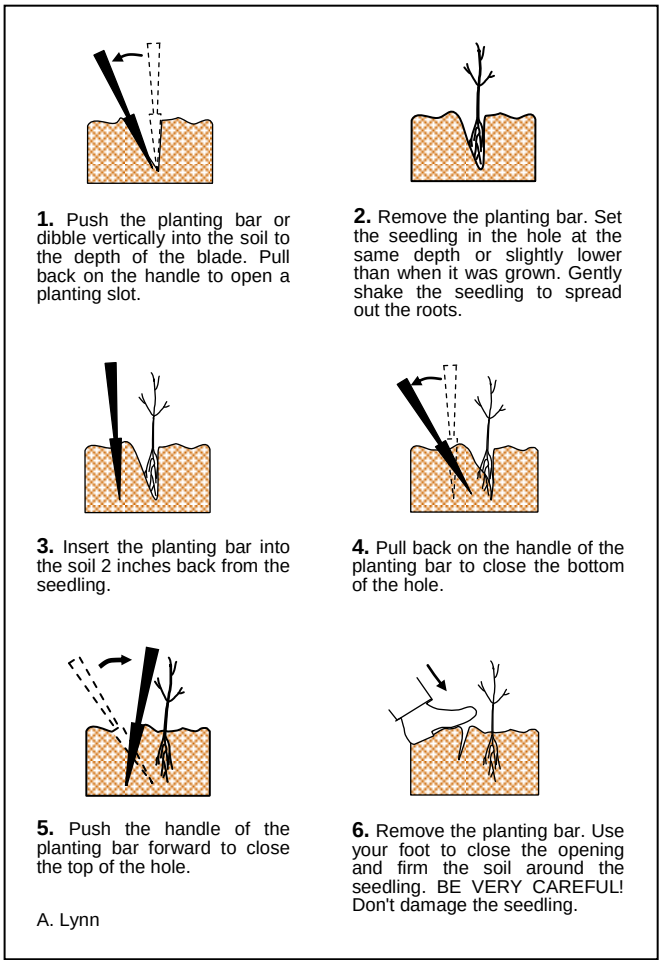

Figure 2. Hand planting bare-root tree and shrub seedlings using a planting bar or dibble.

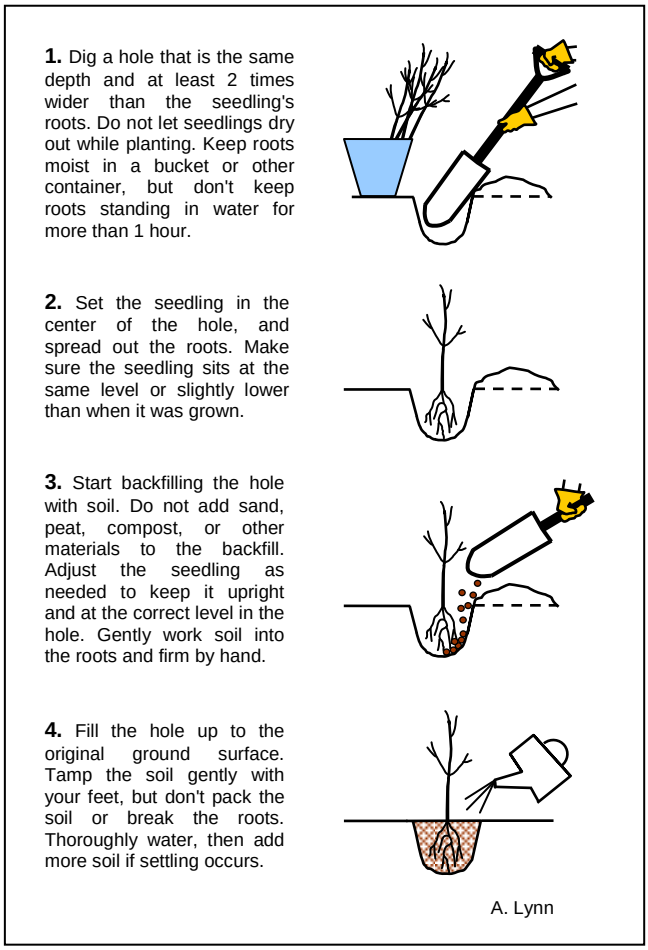

Figure 3. Hand planting bare-root tree and shrub seedlings using a spade.

Lime and Fertilizer

Newly planted trees and shrubs should not be limed and fertilized, unless soil tests show that pH and nutrients are extremely low. For most sites, it's best to allow the root systems of new plantings to become established before applying lime and fertilizer.

PROTECTING PLANTS

Plants should be protected from damage by wildlife, human activities, or livestock by using rodent guards, repellents, tree shelters, fences, and/or other exclusion measures.

Rabbit and Rodent Damage

Rabbits and rodents can use tall grasses and weeds for protection while gnawing on tree and shrub plantings. Mow, mulch, install weed mats, or use herbicides as needed to control vegetation around plantings. Follow recommendations from the Maryland Cooperative Extension when using repellents or poisons to protect plantings from mice and voles.

Tree Shelters

Tree shelters may be used to protect seedlings from competition from weeds, damage by deer and small mammals, and damage by people while mowing, trimming, or spraying around plants. Four-foot tubes are the most common height to provide adequate protection. Five-foot shelters may result in weakened stems, but offer a better chance for tree seedlings to get above the browse line when deer pressure is very high.

Shorter tubes of 2 to 3 feet are preferable for shrub plantings, because shrubs tend to grow out rather than up. In areas where flooding is common, the use of shorter tubes or open weave shelters can prevent damage to the shelter and tree seedlings.

More recently designed tubes are ventilated to allow seedlings to harden off and prevent dieback after the tubes are removed. Tubes are typically translucent to allow sunlight to reach the plant. Although most tree

tubes have a perforation that is supposed to split the shelter when the trunk becomes too large, shelters often need to be manually cut and removed.

Figure 4. A sheltered hardwood tree and shrub planting in a former pasture. *Photo by S. Strano.*

Installation. Push each shelter into the soil to a depth of at least 1 inch to exclude rodents. Stake each shelter with a wooden stake (minimum 1-inch thickness), or a plastic or fiberglass post, that is at least the same height as the tree shelter. Do not use metal or bamboo stakes. Bluebirds and some other birds are attracted to tree tubes and may get trapped inside the tube. Protect birds by installing bird exclusion netting on the tops of tree shelters, and maintain the netting until the plantings extend out of the tubes.

Figure 5. Bird exclusion netting installed on a tree shelter. The netting should be removed when the tree starts growing out of the shelter. *Photo by S. Strano.*

Fences and Access Control

Use fences and other exclusion devices as needed to control livestock and human access to the planting, at least until it is well established. Many types of fences and exclusion devices are available.

Fences may also be used to protect plantings from deer browse where deer damage is known to be severe, or where the planted species are highly preferred by deer (e.g., Atlantic white cedar). When protection is needed for 5 or more years, 8-foot tall woven wire is typically used for a deer exclusion fence. Plastic woven fence may be appropriate on relatively small plantings where regular fence maintenance is feasible.

Some people have successfully used single-strand electric fence baited with peanut butter in foil to protect plants from deer browse. The deer become trained to avoid the area when they receive a small, harmless shock after touching the foil with their noses. Another method of using fence to exclude deer involves parallel runs of wire fence spaced a few feet apart. The constricted landing area discourages deer from jumping over the fence.

Contact your local NRCS Service Center for recommendations for your site.

Figure 6. A naturally regenerating shelterwood cut with a fence to protect from deer browse (above), and no fence (below). The understory of the unfenced stand was so heavily browsed that only ferns remain. These two stands are adjacent to each other. *Photo by S. Strano.*

ESTABLISHING AND MAINTAINING THE PLANTING

Establishing the Planting

Planting year. Control weeds by mowing, hand pulling, or treating with an appropriate herbicide. Mowing should be done with extreme caution to avoid damaging the stems or bark of plantings, especially on seedlings. Vegetation not immediately adjacent to the plantings, such as between rows, can be left for wildlife food and cover (except for noxious weeds, which must be controlled as required by state law).

Herbicides may be spot-sprayed around plantings or applied to the planting strip. Follow specific label instructions to reduce or eliminate damage to trees and shrubs. Do not apply herbicides on windy days when spray drift can damage nearby plantings. Herbicides may be easier to use where seedlings are protected by tree tubes.

Second year after planting. Continue to control weeds by mechanical methods or by treating with an appropriate herbicide. Always avoid damaging the plantings during mowing and herbicide application. If using mulch around plants, do not exceed a total thickness of 3 inches (new mulch, plus any remaining old mulch).

Maintaining the Planting

By the third year, the root systems should be sufficiently established to allow for continued growth and survival. However, competing vegetation, especially introduced perennial cool-season grasses (e.g., tall fescue), can limit tree growth and make trees more susceptible to drought and other environmental stressors. Control of these grasses by mowing or herbicide treatment for 3 to 5 years can promote growth and survival of the planting. Be aware that if you received financial assistance for your tree/shrub planting, there may be restrictions on mowing beyond year 3, so be sure to read any program-specific guidance in your maintenance plan.

For optimum wildlife habitat, all management practices should be conducted outside of the primary nesting season for birds and ground-nesting wildlife (April 15 - August 15). If it becomes necessary to control weeds during the nesting season (for example, noxious weeds), contact your local weed control specialist concerning recommendations for spot-treating the weed problem.

If tree shelters were used, it's best for the health of the trees and the aesthetics of the site to remove and properly dispose of the tree tubes. Remove the tree shelters before they impede the growth of the trunk, but not before the seedlings have adequate girth to support themselves (usually 4 to 5 years after planting). All shelters should be removed by year 7.

Figure 7. A perforated tree tube remains partially wrapped around the trunk of an oak tree planted 15 years earlier. *Photo by S. Strano.*

If you have any questions about tree and shrub plantings, please contact your local NRCS Service Center.

Figure 8. An established pine stand on former cropland. *Photo by S. Strano.*